

Remarks/Arguments

Claims pending

Applicants agree that the pending claims being examined are Claims 12, 13, 27, 32 and 37-39. There presently is no Claim 40.

Information Disclosure Statement

A copy of the Korean patent KR 2002-072671 published September 18, 2001 is enclosed to complete the prior IDS record. As this is completion of the prior submission of the Abstract for this citation, Applicants believe that no further charge for its submission is required. However, if a charge is required, please charge the Deposit Account on page 1 of this paper.

Specification

Applicants acknowledge that the priority claim has been removed.

Drawings

Applicants are pleased that the drawings are now acceptable.

Claims

Rejoinder of the claims of Groups I and III is requested, when appropriate, as the scope of these claims is coextensive with Group II claims. Applicants have amended these claims to maintain this relationship such that rejoinder is possible. If such rejoinder is not done, then Applicants reserve their right to file divisional application(s) to the prior restricted claims of Groups I and III.

The above claims have been amended to permit rejoinder.

Claim 12 has been amended to clearly indicate that the binding of the dendron to the nanoparticle is at the focal point of the dendron and NOT at the surface of the dendron. In Example 21 as the elected species the aryl phosphine is used as a focal point binding site to the quantum dot (page 20, line 11) and the Figures also support this point (see Fig. 3 and others).

Applicants respectfully request that these claim amendments now be entered as Applicants believe that these amendments make the claims allowable. Although Applicants do believe that any additional fees are due for these claim amendments, if we are in error, please charge any fee to our Deposit Account given on page 1 of this paper.

Rejections

35 USC §112, First Paragraph, written description for Claims 12, 13, 27, 32 and 37-39

In Example 21 aryl phosphine is used as a focal point binding site to the quantum dot (page 20, line 11) and these aryl groups will not block any photoluminescence and phosphine passivation may not quench the photoluminescence (PL) which is essential for bio-labeling (page 20, lines 13-15). A general teaching for this aryl not blocking photoluminescence is stated on page 7, lines 29-30.

It is apparent that such insertion now in the claim to “without quenching the photoluminescence” is supported by this general teaching on page 7.

Applicants believe that therefore there is a general teaching for this addition to Claim 12 such that written description requirement is met for Example 21 as a specific example and page 7 for a general support.

Applicants respectfully request removal of this rejection.

35 USC §112, Second Paragraph, indefinite for Claims 12, 13, 27, 32 and 37-39

In Example 21 aryl phosphine is used as a focal point binding site to the quantum dot (page 20, line 11) and these aryl groups will not block any photoluminescence and phosphine passivation may not quench the PL which is essential for bio-labeling (page 20, lines 13-15). A quantum dot, by its very definition, has photoluminescence. Fig. 3, Example 21, and all of the metal nanoparticles with a dendron can form a quantum dot. According to Wikipedia -

Quantum dots are particularly significant for optical applications due to their high extinction co-efficient. In electronic applications they have been proven

to operate like a single-electron transistor and show the Coulomb blockade effect. Quantum dots have also been suggested as implementations of qubits for quantum information processing.

The ability to tune the size of quantum dots is advantageous for many applications. For instance, larger quantum dots have a greater spectrum-shift towards red compared to smaller dots, and exhibit less pronounced quantum properties. Conversely, the smaller particles allow one to take advantage of more subtle quantum effects.

Researchers at Los Alamos National Laboratory have developed a wireless device that efficiently produces visible light, through energy transfer from thin layers of quantum wells to crystals above the layers.

Being zero dimensional, quantum dots have a sharper density of states than higher-dimensional structures. As a result, they have superior transport and optical properties, and are being researched for use in diode lasers, amplifiers, and biological sensors. Quantum dots may be excited within the locally enhanced electromagnetic field produced by the gold nanoparticles, which can then be observed from the surface Plasmon resonance in the photoluminescent excitation spectrum of (CdSe)ZnS nanocrystals. High-quality quantum dots are well suited for optical encoding and multiplexing applications due to their broad excitation profiles and narrow/symmetric emission spectra. The new generations of quantum dots have far-reaching potential for the study of intracellular processes at the single-molecule level, high-resolution cellular imaging, long-term *in vivo* observation of cell trafficking, tumor targeting, and diagnostics.

Thus a person skilled in this art would not need anything further to understand what was meant. However, to add further wording “of the composition” may be what the Examiner is requesting for clarity so this has been added to the claim.

35 USC §102(b) of Claims 12, 13, 27, 32 and 38 anticipated by Vossmeyer et al. (US 2003/0109056)

Although dendrons are a portion of a dendrimer, they will behave very differently when a focal point attachment to the nanoparticle is envisioned as is the present case. The dendron focal point attaches to the linking group that attaches to the metal nanoparticle (see Fig. 3). A dendrimer is like a tennis ball where the outer surface has reactive groups that can bind in various ways to other compounds. A dendron is like a wedge to the center of such a tennis ball. The focal point is in the center of the tennis ball. In a book edited by one of the inventors, Fig. 1.8 on page 15

(copy enclosed, Dendrimer and Other Dendritic Polymers, eds. Jean M. J. Fréchet and Donald A. Tomalia, pub. John Wiley & Sons, Ltd., 2001), shows in partial structure the difference between a dendron and a dendrimer. Although it is possible to take dendrons and join them at their focal points to form a dendron (a way to make dendrimers by convergent synthesis), it is not available to “cut up” a dendrimer to get to the dendrons; rather you make the dendrons deliberately. Although two dendrons can be joined at their focal point with a bridging group in a manner to break apart to be dendrons, they do not form a dendrimer with such a bridge. Unless you have a dendron, the focal point is not available in a dendrimer to react with other compounds, only the dendrimer surface groups can react.

In Example 21 (the elected species), aryl phosphine is used as a focal point binding site to the quantum dot (page 20, line 11). A metal nanoparticle bound to a dendron makes the quantum dot. Applicants need not show all focal points but that these are clear from the Figures(shown in the present specification by Figs. 7, 8, 9 and 18 as a wedge shape) and they bind in similar manners at their focal points. The disclosure of dendrimers Vossmeyer *et al.* of will not be able to react with a nanoparticle at a focal point as the focal point is buried in the center of the dendrimer, is usually fully reacted and not structurally available for reaction.

Regarding Claim 32, Vossmeyer *et al.* teach analytes such as toluene and tetrachloroethylene which have an odor. However, an odor that is unpleasant is NOT a fragrance.

Applicants believe that the term “fragrance” should be defined by the American Heritage Dictionary:

fra·grance (frā' grāns)

n.

1. The state or quality of having a pleasant odor.
2. A sweet or pleasant odor; a scent.
3. A substance, such as a perfume or cologne, designed to emit a pleasant odor.

Synonyms: fragrance, aroma, bouquet, perfume, redolence, scent

These nouns denote a pleasant or sweet odor: *the fragrance of lilacs; the aroma of sizzling bacon; the bouquet of a fine wine; the perfume of roses; the redolence of fresh coffee; the scent of newly mown hay.*

The American Heritage® Dictionary of the English Language, Fourth Edition copyright ©2000 by Houghton Mifflin Company. Updated in 2009. Published by Houghton Mifflin Company. All rights reserved.

Therefore toluene and tetrachloroethylene, although having an odor, would not be considered a fragrance.

The above Claim 12 has been amended to indicate that the dendron focal point is the reactive site with the quantum dot/nanoparticle. Since all other rejected claims depend from Claim 12, no further amendment of claims for this issue was deemed needed. Applicants therefore respectfully request that Vossmeyer *et al.* be removed as a citation for anticipation as it is no longer within the scope of these amended claims.

35 USC §103 of Claim 39 as unpatentable over Vossmeyer *et al.* (US 2003/0109056)

A core, *only when it is not fully reacted and structurally and sterically accessible*, can be a focal point of a dendron. All the dendrimer cores which form a focal point are unavailable for any reaction to form a quantum dot.

If the citation forms no dendrons, there is no practical way to form dendrons from the dendrimers, and the reaction of the cores as focal points for reaction are not taught, then the cited reference does not teach or suggest how to make the dendrons of this invention or the use of attachment groups at such focal point to make a quantum dot.

In contrast, this invention demonstrates a sophisticated system with clearly defined components, *e.g.*, in the elected species of ethylene oxide, benzoic acid, phosphine of the structure given with at least one aryl group. Applicants believe that the specific formulae now in the amended claims distinguish over Vossmeyer *et al.*

Applicants respectfully request that Vossmeyer *et al.* be removed as not relevant to this invention.

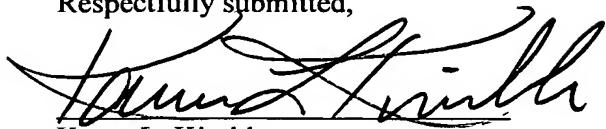
Conclusions

Applicants believe that they have responded to all items in this Action. The amendments to the claims are to put them into condition for allowance. However, if the Examiner has any questions concerning this Response, please contact the undersigned. If there are still unresolved issues, Applicants respectfully request that

US Serial No. 10/565,478
Amdt. Dated July 6, 2010
Reply to Office Action of Apr. 8, 2010

the Examiner contact the undersigned to expedite allowance of the claims. Applicants respectfully request allowance of these claims.

Respectfully submitted,



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Enclosures

- Dendrimer and Other Dendritic Polymers, eds. Jean M. J. Fréchet and Donald A. Tomalia, pub. John Wiley & Sons, Ltd., 2001, at Fig. 1.8 on page 15
- KR 2002-072671
- Post Card